Vedanta Letters

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Panchang, Part I

पंचाग, भाग १

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Panchang is a unique concept in Hindu Calendar System. Hindu festivals, tithis, appropriate Muhurats and other important celestial events such as Grahans are determined based on Panchang, therefore, it is important to understand Panchang. The logic behind Panchang is not easy to understand. It requires study, and of course patience. Nevertheless, I think every Hindu should have basic knowledge of panchang because it governs daily life for most Hindus in the world. We do not realize but panchang has become one of the elements of our lives. Most of us go to the temple based on Panchang. Most of the auspicious Hindu undertakings are based on Panchang. As an example, Satyanarayan Katha in the temple is based on Poornima tithi.

What is Panchang? The word Panch means Five and Anga means Part, hence putting these two words together it means Five Parts or Five Elements. Each of these elements or parts of a panchang is important in making a Hindu calendar. In Western Calendar, somewhat close to Panchang is Western Ephemeris. I classify Panchang into two: Jyotish (ज्योतिष) panchang and Commerce (व्यावहारिक) panchang.

* Jyotish (ज्योतिष) Panchang consists of Tithi, Var, Nakshatra, Yoga and Karan. It is mainly used for astrological forecasts and horoscope related matters.

* Commerce (व्यावहारिक) Panchang consists of Tithi, Var, Nakshatra, Mas, and Moon Rasi. It is mainly used to determine hindu festivals, muhurats and so on. This panchang is referred mainly by priests and householders to check Tithis, Var, Muhurat and so on.

History of Panchang. In earlier days, Panchang used to be derived from Grahaladhav (ग्रहलाधव) granth which was written by Pandit Daivagya about 500 years ago. The Grahaladhav granth was the basis of all Panchangs in India till early 1900's. Since this Granth had inherent flows in calculations, hence the Panchang derived from this Granth was not accurate and over a period of time, derived Panchang drifted from the actual positions of the Sun, Moon and other planets [2]. In order to correct the inaccuracies in calculations and to address the modern day needs, Janmabhumi Press and Sandesh Press in Gujarat came up with altogether a new method to derive the present day Panchang which is partly based on Grahaladahv granth, Western Ephemeris published in UK and rules set by the Indian Calendar Reform Committee in 1955. Janmabhumi and Sandesh panchangs are the most accurate and authoritative panchangs in India and elsewhere in the world [7].

Now let us discuss each of the elements of Jyotish and Commerce panchangs.

Tithi: Tithi (तिथि) is perhaps the most known element of panchang because most of the Indian social and religious festivals are celebrated based on *tithi*. Tithi is also perhaps the least understood element of panchang. In vedic timekeeping, a **tithi** (also spelled *thithi*) is a lunar day, or the time it takes for the longitudinal angle between the moon and the sun to increase by 12° [6]. Tithis begin at varying times of day and vary in duration from approximately 19 to approximately 26 hours based on the angular rotation of moon around the earth in its elliptical orbit. There are 30 tithis in each lunar month (360°/12° results in 30 tithis in a month). Each lunar month has two fortnights, each lunar fortnight (paksha) consists of 15 *Tithi*s.

The basis for the length of a Tithi is the angular distance between the sun and the moon as seen from the earth. As the moon rotates around the earth, the angular distance between the sun and the moon as seen from the earth increases from 0° to 360° (Figure 1). It takes one lunar month or about 29 solar days for the angular distance between the sun and the moon to change from 0° to 360°. When the angular distance reaches zero, the next lunar month begins. Thus, at the new moon (अमास) a lunar month begins (in Gujarat a new lunar month begins at New moon, in Northern India a new

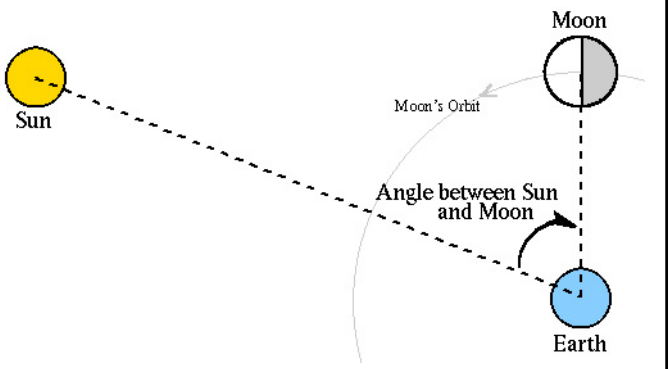
lunar month begins at Full Moon). At full moon (पूनम), the angular distance between the sun and the moon as seen from the earth becomes exactly 180° (Figure 2).

The lunar cycle begins with crescent moon and the crescent phase lasts till that phase culminates in the full moon, typically lasting for about 15 days. Then the moon enters in the waning phase until it disappears from the sky by lining up with the Sun. The waning phase also lasts for about 15 days.

According to Indian lunar month, the crescent lunar phase fortnight is called *Shudha or Shukla Paksha* (शुकल पक्ष) and the waning phase of the lunar cycle fortnight *Wadya or Krushna Paksha* (कृष्ण पक्ष). Thus, during *Shudha (or Shukla) Paksha* the angular distance between the moon and the sun varies from 0 degrees to 180 degrees while that during the *Wadya (or Krushna) Paksha* from 180° to 0°. If we divide 180° into 15 equal parts, then each part becomes of 12° in length. Thus, this each twelve-degree portion of angular distance between the moon and the sun as it appears from the earth is the lunar date or *Tithi*. *Tithis* or lunar dates in *Shudha (or Shukla) Paksha* begin with *Prathama* (first), *Dwitiya* (second), etc. till we reach the *Poornima*, the lunar date for full moon day. Similarly for the waning fortnight lunar cycle or *Wadya (or Krushna) Paksha*, *tithis* begin again with *Prathama* (first), *Dwitiya* (second), etc. till we arrive *Amavasya* or the new moon.

Thus when we refer to *Ramnavami* (the birthday of *Rama*), it's *the Navami* (ninth lunar day) of *Shudha Paksha* of the lunar month *Chaitra, or Chaitra Shudha Navami*. Similarly, the *Gokulashtmi* (also called *Janmashtami*, the birthday of *Krishna*) occurs on *Shrawan Wadya Ashtami* (eighth lunar day of *Wadya Paksha* of the lunar month *Shrawan).*

Figure 1. Longitudinal Angle between Sun and Moon, as seen form Earth. Source : Ref. [3].



Why sometimes a tithi extends (वध तिथि) **over two days and sometimes a tithi is skipped** (क्षय तीथि)**?** This concept is practiced only for the Commerce (व्यावहारिक) Panchang. In actuality this does not happen. Tithis always occur in sequence. There is no skipping (क्षय तिथि) or extending (वध तिथि) of a tithi. Now let us understand this concept. In order to understand this concept, you must note the sunrise time and your relative position on earth.

Since the angular distance between the moon and the sun as referred here is always relative to the entire earth, a lunar day or *tithi* :

- **starts at the same time everywhere in the world but not necessarily on the same day;** and,
- **according to commerce panchang, the tithi at the sunrise will be the tithi for the entire day for that location.**

These two concepts are very important to note! Thus, when a certain *tithi* starts at 10:30 PM in India it also begins in New York at the same time, which is 12 Noon (EST) on the same day. Since the length of a *tithi* can vary between 19 to 26 hours, its correspondence to a *Var (a* weekday) becomes little confusing.

The angular velocity of moon in its elliptical (think of an oval shape fruit) orbit around the earth continuously varies as it is affected (according to Kepler's rule, refer to high school Physics) by the relative distance between the earth and the moon, and also by the earth's relative distance from the sun. As a result, the daily angular speed (the speed of the angle between the moon and the sun as seen from the earth) varies somewhere between 10 to 14 degrees. Since the length of a *tithi* corresponds to 12 such degrees, the length of a *tithi* also varies accordingly. Therefore, a *tithi* can extend over one day (24 hour period) or it can get skipped if two *tithis* occur in one day. Now let us understand through an example:

Suppose on a Monday sunrise in New York city occurs at 7:00 AM (EST). Further assume that at 9 AM (EST) on Monday the angular distance between the sun and

moon is exactly 12 degrees just following the new moon of the Indian lunar month *Kartik.* Since the length of a *tithi* is 12 degrees, the *tithi, Kartik Shudha Dwitiya* (second day) begins exactly at 9 AM on Monday of that November in New York. However, at the time of sunrise on that Monday the *tithi Dwitiya* has not begun. Therefore, the *tithi* for that Monday for city of New York is *Kartik Shudha Prathama* (first day) [5].

On the same Monday morning the sunrise in Los Angeles occurs well past 9 AM (EST). Since the *tithi Dwitiya* occurs everywhere in the world at the same instant, therefore, for Los Angeles, the *tithi* for that Monday would be *Kartik Shudha Dwitiya. Please refer to the Table I.*

For the same Monday at 9 AM (EST), it would be 7:30 PM in Mumbai or New Delhi. Thus, *Tithi* for that Monday for city of New York, Mumbai, and New Delhi is *Kartik Shudha Prathama* (the first day of Indian lunar month *Kartik*) while for most of the regions west of Chicago or St. Louis the *tithi* for that Monday is *Dwitiya*. In other words, the *tithi Kartik Shudha Prathama* for regions west of Chicago or St. Louis should occur on the preceding day, the Sunday.

Kartik Shudha Prathama (the first day of Indian lunar month *Kartik*) also happens to be the first day after *Diwali*. Most of the Indians celebrate this as their New Year's day. Indians living in India, Europe, and eastern part of the United States thus should celebrate their New Year on that Monday while regions west of Chicago should on the preceding day, the Sunday.

Figure 2. Phases/Titthis fo the Moon. Source : Ref. [4].

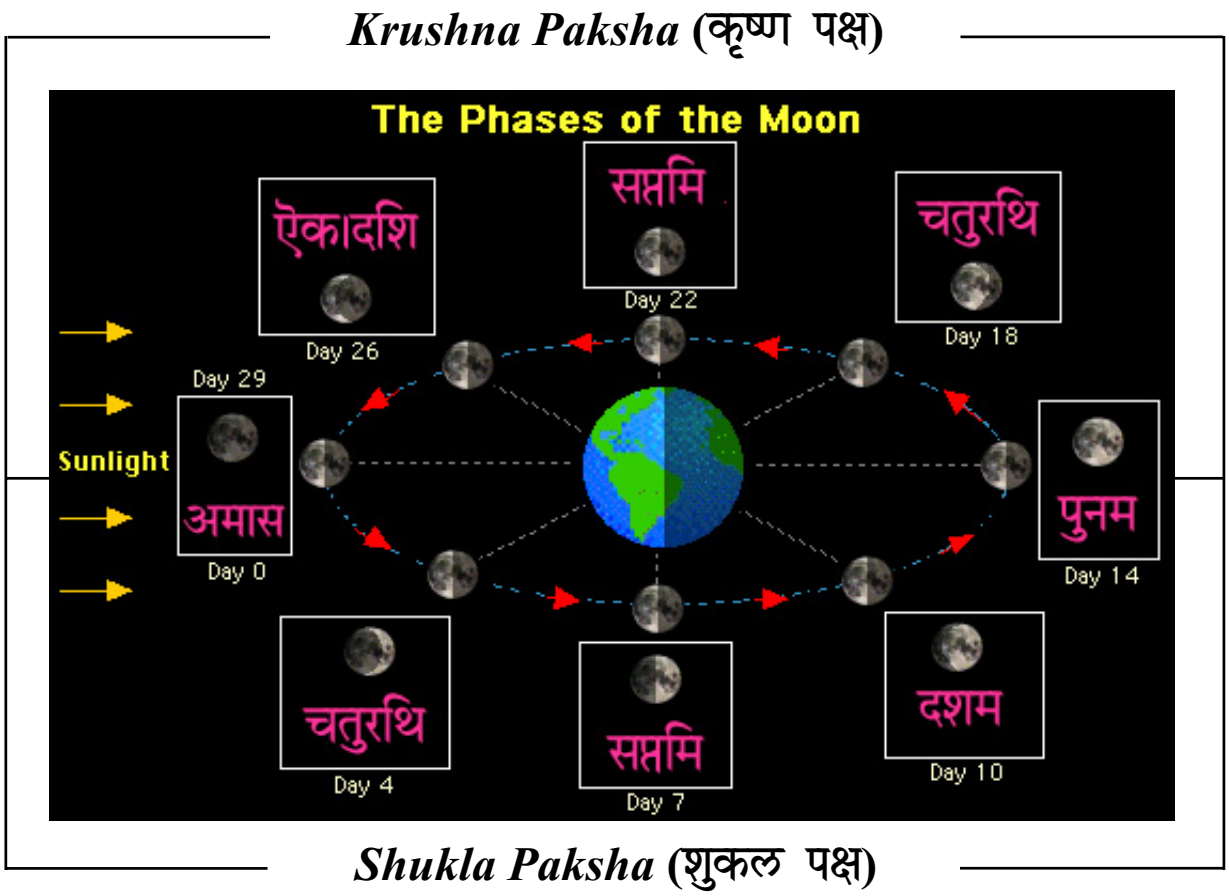


Table I: क्षय तिथ and वध तिथि in NY and LA, USA.

	Time	Monday's Tithi	Tuesday's Tithi	Wednesday's Tithi
	6:00 AM	1	3	3
Sunrise in NY	7:00 AM	1	3	3
	8:00 AM	1	3	4*
	9:00 AM	2*	3	4
Sunrise in LA (EST)	10:00 AM	2	3	4
	11:00 AM	2	3	4
	12:00 NN	2	3	4
	1:00 PM	2	3	4
	2:00 PM	2	3	4
	3:00 PM	2	3	4
	4:00 PM	2	3	4
	5:00 PM	2	3	4
	6:00 PM	2	3	4
	7:00 PM	2	3	4
	9:00 PM	2	3	4
	10:00 PM	2	3	4
	11:00 PM	2	3	4
	12:00 MID	2	3	4
	1:00 AM	2	3	4
	2:00 AM	2	3	4
	3:00 AM	2	3	4
	4:00 AM	2	3	4
	5:00 AM	3*	3	4
Tithi for the day in NY		Ekam	Trij	Trij
Tithi for the day in LA		Beej	Trij	Choth
* Start of a new Tithi				

In the above table Beej is a क्षय तिथ and Trij is a वध तिथि in NY. There is no क्षय तिथ or वध तिथि in LA.

References:

1. Grahaladhav Granth, Bombay Press, 1958.

2. Learn How to make a Horoscope, In Gujarati, Sahitya Sangam, Bombay, 1970.

3. http://www.astro.washington.edu/labs/eratosthenes/rung3.html

4. http://www.enchantedlearning.com/subjects/astronomy/moon/Phases.shtml

5. http://www.boloji.com/astro/00321.htm

6. http://en.wikipedia.org/wiki/Tithi

7. Janmabhumi Panchang, Bombya, 1985.

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9. Encyclopedia Britannica.

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कर्मणा जायते जन्तुः कर्मणैव प्रलीयते ।
सुखं दुःखं भयं क्षेमं कर्मणैवाभिपधते ॥

It is by the force of *karma* that a living entity takes birth, and it is by *karma* alone that he meets his destruction. His happiness, distress, fear, and sense of security all arise as the effects of *karma*.
Srimad Bhagvatam, *Skandh* 10, *Chapter* 24, *Sloka* 13